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ABSTRACT

Although there is valid concern with the limited supply of natural resources and how this supply is affected by increasing population and a life style based on consumption, a more important concern is with the future quality of those natural resources. The focus in the past has been on the production of goods for sale, very little on the welfare of the consumer, not at all on what happens after the consumer has discarded a product. But there is increasing awareness that unlimited and uninhibited personal consumption is simply incompatible with preservation of resources and environmental quality. American people will be forced to decide how much of a trade-off they want to make between environmental quality and consumption. Pollution exists not as a result of the evil actions of one or a few polluters, but as part of a large and complex production and consumption structure. Fundamental changes in this whole production-consumption-residual cycle will have to be made and, although individual action has a role in this change, this role is limited. Greater social-legal controls over individual action will be a necessary force in bringing about this change. Despite the loss to the individual of certain specific freedoms, a reasonable curbing of uninhibited action may actually increase freedom for all. (JLB)

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RESOURCE USE PLANNING

by

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Resources for the Future
Washington, D. C.

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The amount and kind of natural resources consumed or used by a nation or a region depends upon the number of its people, their average per capita incomes, and their life styles. More people require more resources, other factors being the same; there is reason to believe that twice as many people will require twice the natural resource use, for instance. But numbers of people alone are not determinative of resource use; their average incomes, in real terms, determine the ability of each to consume the good things of life, and this in turn determines the resource requirements of the country or region. The vast populations of China and India do not require anything like the tonnage of metals and fuels, for instance, that the United States, with a much smaller population, requires. Rising real productivity per worker or per person both aroses from greater production and takes the form of greater consumption per capita, and requires greater input of natural resources.

But the life style of a nation also affects natural resource use. Ours is a gadget society or culture. Merely look around you, in your own home, for evidence in support of this statement. Today very few American families which can afford a car are without one -- or two, or three; most have television, radio, and hi fi phonographs, often several to a home; the modern kitchen is so full of electrical gadgets that the New Yorker once ran a

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prophetic cartoon of the housewife with her degree in electrical engineering hung on the kitchen wall; we seem to require electric toothbrushes and electric cocktail stirrers; one need only read the advertisements in a magazine aimed at the luxury trade, especially at this season when Christmas shopping is in full swing, to see how imaginative industry has been in developing gadgets for the affluent consumer. It is easily possible to imagine a different kind of life style, with equal real incomes per capita, that would require a great deal less natural resources.

Much public attention has been directed to controlling the rate of population increase; organizations have been formed to promote the idea of zero population change. It is rather ironic that so much popular attention has been focused on population growth in these past few years when the people of the United States are moving so rapidly in the direction of a birth rate which will, in time, produce a stationary population. Most people do not seem to realize how drastically birth rates have fallen in the past decade; from a postwar level of about 25 births per 1,000 total population, they have now fallen to about 18. This drop of approximately a fourth may not seem like much, but a further proportionate drop to 14 or thereabouts would, in time, produce a stationary population. With so many relatively young people now in the population, further increases in total population are inevitable even if the birth rate per 1,000 women of child-bearing ages fell at once to a constant reproduction level. I do not mean to minimize the population problem in the United States, and in many other parts of the world it is enormously more serious; but I think we should recognize the changes that are now under way.

Population control alone would have only a limited effect upon resource use, as long as per capita incomes are high and rising. There is an almost

unanimous consensus among economists today that the past rates of increase in real incomes in the United States will continue, more or less unchanged, more or less indefinitely into the future. An approximate doubling in real incomes per capita has occurred each generation in the past, and seems likely to continue to do so. At my age, one realizes that a substantial proportion of the American public lives today at what in a past generation would have been considered great luxury; young people take for granted today a level of living which their grandparents never dreamed of; and I predict that they, in turn, will be overwhelmed by what their children and grandchildren expect in terms of consumption styles.

In spite of our gadget life style and of our uninhibited consumption patterns, use of many natural resources has not increased as fast as has our consumption style. The natural resource input into the national economic output has declined relatively in the past several decades, while rising in absolute terms. There are several reasons why this is true: we use many natural resources much more efficiently today than a generation ago -- we get twice or more the electric energy from a pound of coal, for instance; we process a given resource input into a more refined product -- contrast the metal in a space rocket with the metal in a steel rail, for instance; and proportionately more of our output consists of services, rather than of goods.

The research organization with which I am connected concluded some years ago that the quantity of essential raw materials would be sufficient for an indefinite period into the future to sustain our growth in economic output. The consumption of goods and services by the American people is not likely to be seriously restricted by scarcity or high prices of raw materials.

This assumes continued trade with the rest of the world, and continued technological advances. This relatively comfortable conclusion may not hold equally well for all parts of the world, but great flexibility of raw material use exists in large part because of our technological ability to innovate, substitute, and economize.

The quality of our natural environment, and of the resources we use, is another matter. There will be plenty of water and air for our needs, but how badly polluted; plenty of space and land, but how badly disfigured? Our attention shifted some years ago to problems of the quality of the environment, and I plan now to do the same this morning.

Cycles of Production, Consumption, and Residuals

The aim of the manufacturer, the objective of economic measurement, and the public concern over economic health have all focused, in the past, upon production of goods for sale. We are now beginning to realize that the delivery of a consumption good to the consumer is not the end of the process, not the full story. As a Nation we have paid only limited attention to the consumption use of the goods bought by the consumer; from time to time there have been some stirrings, but not much more. We do have food and drug laws, and health inspection of foods, and safety requirements for electrical and other goods; and we are now adding safety requirements for autos. But our concern over the welfare of the consumer has been limited, and tempered greatly by the opposition of manufacturers to control measures aimed to protect consumers. Our concern over the ability of goods really to serve the consumer has been nearly nil; we have relied upon the market processes and competition to provide good, if not the best, service to the consumer. Consumers have not been free of blame, either; we buy the shiny new auto or other gadget, with scarcely a thought of how much maintenance it is likely

to take, or of how cheaply it can be repaired. Indeed, often a careful buyer would find it nearly impossible to obtain reliable information on such matters, even if he chose to take them into account.

But our concern with what happens after the consumer has discarded a product has been nearly zero. When he threw it away (whatever it was), someone else was expected to dispose of the remains -- flushed down the drain, or thrown into the garbage can, but out of sight and out of thought of the consumer. The general public, or part of it, has wakened these past few years to the realization that waste and garbage disposal was a major problem -- so major, in fact, that the very quality of urban life depends upon it.

Our scientists and engineers are now beginning to point out that the volume of "residuals" from the consumption process is exactly equal to the volume of production; nothing is ever really destroyed, but only converted to other forms. This is the law of the conservation of matter, which we learned in high school or college science courses, and now applied to the totality of production, consumption, and disposal. The food, liquid, and air the individual takes into his body must come out, and be disposed of; likewise, the fuel, water, food, clothing, building materials, and other inputs into a great city like New York must move out, some way, to some place, in some form. We can flush them down the drain, to show up as water pollution; we can burn them, to show up as air pollution; or we can bury them, as solid wastes. To some degree, there can be a trade-off; old newspapers, for instance, can be burned or buried; or stack-gasses can be scrubbed and the particulates buried or flushed down the river instead of being discharged into the air; and so on. But complete destruction of materials

is impossible; they show up some place, in some form.

This cycle of production, consumption, and residuals, and this identity of input and output, is so basic to natural resource problems that the rest of this paper is concerned with pursuing some of the necessary implications and consequences.

Unlimited Consumption versus Resource Quality

Unlimited and uninhibited personal consumption by everyone, of everything in every form they want and can afford, is simply incompatible with preservation of resource and environmental quality. In this aspect of life, as in others, one cannot both eat his cake and have it too. Some choices, sometimes some hard and unpleasant choices, must be made.

For instance, the average consumer wants to be able to use all the electricity he wants, for any purpose he wants, whenever he wants it -- to flip the switch for lights, air-conditioning, or whatever, and have as much electricity as he wishes. For a long time, the cost of the electricity-using goods, perhaps more than the cost of the electricity itself, acted as an effective rationing factor, although electric energy consumption did rise steadily and rapidly. But the problems of electricity generation have loomed very large in the past decade. The fight over Storm King generating plant, over location of proposed atomic power plants, over location of power lines, and other events have brought home to the electric utilities as well as to at least part of the general public, that one cannot both have all the electricity one wants and at the same time have no disturbance to the "natural" environment.

This past summer we have all experienced personally the consequences of this fundamental incompatibility of uninhibited consumption and of

environmental preservation. The Northeast did experience some brownouts this past summer; under different weather conditions, these could have been much more serious; the danger of worse brownouts in the future is not past. I do not intend to dissect this Northeast power situation further, to try to fix responsibility, or to suggest a program for its alleviation. The power situation is only the most obvious illustration of the incompatibility of uninhibited consumption and preservation of environmental quality. Similar relationships exist with the private auto and air pollution, and with other resource use situations.

The American people will be forced to choose, in many similar situations, how much consumption, of what, they really want; and how much environmental preservation, of what specific kind, they want; and how to trade one off against the other. The trade-offs are not totally fixed and invariable; one of the objectives of research and planning is to devise new technologies and new institutional arrangements, so that less of both consumption and of environment must be given up. But no amount of research nor planning can fully remove the necessity for hard choices.

Pollution

The public news media these days are full of stories about pollution. There is much talk about the need to stop polluting certain streams or rivers, or the air. In the minds of many people, there seems to be a need to identify some environmental polluter, stop him, and thus restore the situation to some assumed pristine condition. I have referred to this as the search for an environmental devil. If there is pollution, there is surely someone responsible, and surely he can be stopped, if one has the necessary political and legal power.

There is indeed often some source of pollution, and some control over it may be necessary. But this attempt to identify the devil-polluter usually ignores the fact the primary source of the pollution produced goods or commodities which other people bought and consumed. In other words, the primary source of pollution does not exist in a vacuum, but rather as part of a large and complex production and consumption structure. If there were no demand for the output of the polluter, he would not operate. If he is somehow stopped, or prevented from pollution, or forced to modify his operations in some way, this will have its effect upon the consumers of his output, and often upon his employess as well. The competition between environment and the jobs and business a polluter creates is sharp in many areas, and again some hard choices may be necessary. All of this does not argue that pollution should continue unchecked and unabated, but it does suggest that its control is not as simple as some commentators seem to suggest.

Fundamental Changes in the Production-Consumption-Residual Cycle

If stopping of pollution is neither simple nor quick, this leads into a consideration of more fundamental changes in the whole production-consumption-residual cycle. Instead of producing goods with the sole objective of selling them at a satisfactory price to consumers, more attention will have to be given to goods that really meet tne needs of consumers and that can be recycled more efficiently. Instead of concern over how to rid ourselves of pollution, attention may have to be directed to avoiding the pollution in the first place. Perhaps some examples will help.

Manufacture of automobiles in this country has exceeded five million annually for a long time. Every one of these cars some day becomes inoperable at reasonable cost and for acceptable standards of performance. It is

junked, or abandoned somewhere. The country has millions of defunct automobiles, in thousands of locations -- some simply abandoned on city streets It often does not pay to try to salvage the hulks, or any parts that cannot be sold to the owner of a used car for its repair. No automobile in the United States has ever been designed for efficient junking. Although a defunct auto contains many pounds of various metals, it often costs more to recycle those metals into a useful production process than they are worth. Part of the difficulty lies in separating the various kinds of metals and other products, part lies in the paints and other materials which contaminate the metals, and part lies in the labor and other costs of the junking process, including the transportation involved. Some cities have now managed to develop auto junking plants which seem to have a reasonable prospect of economic operation, but many cities lack such plants. If all autos could be junked and their metal recycled, the demand for new metal for auto production would fall drastically.

Recent legislation has attempted to increase auto safety and to reduce air pollution arising from automobile operation, but virtually no public effort has thus far been directed toward salvage of the materials in the abandoned cars. The most we have done is to try to hide them, out of sight of most people. Suppose that the automobile manufacturers tried to design a car that could be junked profitably; could they succeed? Would it cost more to make? Would it be equally satisfactory to drive? Would consumers be equally or more willing to buy such cars? Is there any prospect that auto manufacturers will in fact design and build such cars, without some form of governmental control or encouragement?

I do not wish to single the automobile industry out for special attention. Much the same think can be said about containers for food and drink.

The beer, soft drink, and food processing industry has traditionally focused its attention on getting a good product to the consumer, in a form convenient for his consumption. The can, steel or aluminum, and the nonreturnable bottle have become part of this process. More than 40 billion such containers are thrown away in the United States every year now; if present trends continue, by 1980 the number of throw-aways will reach 100 billion annually. A few beer companies using aluminum cans have developed programs to buy empty cans at metal salvage prices, and there is growing support for use of returnable bottles, but most drink containers today are discarded without re-use -- and become solid waste that must be disposed of somewhere, some way.

And one could go on; almost every item in our complex and varied personal consumption habits shows much the same characteristics. The American society might simply try to dispose of the residuals that this process creates, but this would often be difficult or impossible. My position is that, as a society, we should carefully re-examine the whole production-consumption-residual cycle. If we really have to live with our garbage, are we sure that we want to produce all of it? Maybe we can devise or find ways of producing goods that will be almost or fully as satisfying, not much if any more costly to produce, that will serve us better while in use or under consumption, and that in the end the residuals can be recycled at a profit or without cost.

Maybe it will prove impossible to achieve all these objectives; maybe we will have to pay more for the things we consume, or put up with somewhat less desirable products, or pay something to make recycling possible. I think a great deal can be accomplished by research and design aimed at answering these questions; but new orientations of research will be required. Moreover, new standards and objectives of manufacturing processes will be

required. Consumers will have to recognize that they have some responsibility for what happens; that environment is not something which someone else should protect.

Social Controls over Individual Action

The foregoing analysis brings me to my final subject. I greatly doubt that millions of consumers and thousands of producers acting individually will collectively decide to produce and consume the whole range of consumption goods in ways that will minimize the environmental impact. As a consumer, I find it convenient to buy liquids in nonreturnable bottles, even while as a researcher I am aware of their environmental impact. As a consumer, I am limited in my choice of automobiles to those models which manufacturers produce; and if an effectively junkable auto were produced to sell for a slightly higher price, I perhaps would be unwilling to buy it. The manufacturer of virtually every kind of consumption good has focused his attention on getting an attractive product to the consumer, rightly judging that his income could thus be higher than if he gave much attention to its later use by the consumer or to its ultimate disposal. Each of us, uninhibitedly pursuing our own ends -- "doing our own thing" -- has participated in creating situations which are intolerable for the longrun.

I see no alternative than greater social controls over individual action in the future. As individuals, we can see broad social problems and be willing to assist in their solution, when as individual actors we will take steps not in conformity with a sound overall solution. Social controls are mostly effective by government action. Laws can restrain some kinds of activity, or tax others, or reward others in various ways, or otherwise affect individual actions of producers and consumers. The range

of political and legal tools is great; various kinds of measures may be applied in concert. I do not have the time, nor do I care today, to try to pursue all the ramifications of legal controls. I can assert that controls can be fair and democratic in formulation and in application, and that they need not be unduly restrictive, beyond the minimum degree necessary to accomplish their objectives.

But social controls may mean more than laws. Standards of personal conduct and of social acceptability can be highly important, though indirect, influences on individual behavior. Laws and social standards are not contradictory or antagonistic; on the contrary, they are mutually reinforcing. Laws cannot be effective unless there is a very large degree of individual support; social standards often require enforcement upon a minority which is unwilling to conform.

One may well regret that the conditions of modern life require greater social control over individual action. It would be nice if we lived in a world where everyone refrained from doing what is harmful to the group as a whole. As far as I can see, the world was never like this, and various forms of social or group control have always been exerted on the individual. Modern life, with its greater number of people, and with their greater activity which often impinges unfavorably upon other people, simply requires new standards and new ways of acting. A reasonable curbing of individual uninhibited action may actually increase freedom for all, including the person whose actions are restrained.